

8. (new) The method of claim 6 wherein the molar absorptivity is in the range of approximately  $5 \times 10^4 \text{ L mole}^{-1} \text{ cm}^{-1}$  to  $10^5 \text{ L mole}^{-1} \text{ cm}^{-1}$ .

9. (new) The method of claim 6 wherein the desired concentration of the marker is between 1 ppb and 10 ppm.

5 10. (new) The method of claim 6 wherein the marker produces a characteristic peak at a known wavelength.

11. (new) The method of claim 6 wherein the marker contains a compound selected from the group consisting essentially of metal containing and metal free phthalocyanine, metal containing and metal free naphthalocyanine, squarilium, croconic acid, indole and substituted  
10 indole cyanine and carbocyanine, thiazole type cyanine and carbocyanine, oxazole type cyanine and carbocyanine, metal dithiolene complexes, and indoaniline metal complexes.

12. (new) A method for marking a liquid comprising the steps of:  
adding a first marker to the liquid having a molar absorptivity of approximately 5 times  
 $10^4 \text{ L mole}^{-1} \text{ cm}^{-1}$  or greater in the wavelength range of about 600 - 1000 nm; and

15 adding to the liquid a second marker wherein the second marker is a molecular marker.

13. (new) The method of claim 12 wherein the liquid is a petroleum product.

14. (new) The method of claim 12 wherein the desired concentration of the first marker is between 1 ppb and 10 ppb.

15. (new) The method of claim 12 wherein the first marker contains a compound selected from the group consisting essentially of metal containing and metal free phthalocyanine, metal containing and metal free naphthalocyanine, squarilium, croconic acid, indole and substituted indole cyanine and carbocyanine, thiazole type cyanine and carbocyanine, oxazole type cyanine and carbocyanine, metal dithiolene complexes, and indoaniline metal complexes.

16. (new) The method of claim 12 wherein the second marker is non-radioactive.

17. (new) The method of claim 12 wherein the second marker is a polynuclear aromatic hydrocarbon.

18. (new) The method of claim 12 wherein the second marker is a halogenated hydrocarbon.

19. (new) The method of claim 12 wherein the second marker is selected from the group consisting essentially of 1,2-diphenylbenzene, 1,4-diphenylbenzene, triphenylmethane, 1,3,5-triphenylbenzene, 1,1,2-triphenylethylene, tetraphenylethylene, 1,2,3,4-tetrahydrocarbazole, 1,3-diphenylacetone, 2-chlorobenzophenone, 4,4'-dichlorobenzophenone; 4-benzoylphenone; 4-bromobenzophenone, 4-methoxybenzophenone, 4-methylbenzophenone, 9-fluorenone, 1-phenylnaphthalene, 3,3'-dimethoxybiphenyl, and 9-phenylanthracene.

20. (new) The method of claim 12 wherein the molecular weight of the second marker is artificially enhanced.

21. (new) The method of claim 12 wherein the molecular weight is enhanced by the addition of a deuterium atom.

5 22. (new) The method of claim 12 wherein the second marker is selected from the group consisting essentially of acetone, acetonitrile, benzene, bromobenzene, chlorobenzene, chloroform, cyclohexane, dichlorobenzene, trichloroethylene, diethylether, diglyme, dimethylsulfoxide, dioxane, ethanol, methanol, methylene chloride, nitrobenzene, octane, pyridine, tetrachloroethane, tetrahydrofuran, tetrametholsilane, toluene, trifluoroacetic acid, trifluoroethyl alcohol, xylene, ammonium bromide, and acetyl chloride.

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23. (new) A method for marking a liquid comprising the steps of:

adding a first marker to the liquid having a molar absorptivity of approximately 5 times  $10^4 \text{ L mole}^{-1} \text{ cm}^{-1}$  or greater in the wavelength range of about 600 - 1000 wherein the first marker contains a compound selected from the group consisting essentially of metal containing and metal free phthalocyanine, metal containing and metal free naphthalocyanine, squarilium, croconic acid, indole and substituted indole cyanine and carbocyanine, thiazole type cyanine and carbocyanine, oxazole type cyanine and carbocyanine, metal dithiolene complexes, and indoaniline metal complexes; and

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adding a second marker to the liquid wherein the second marker is selected from the group consisting essentially of 1,2-diphenylbenzene, 1,4-diphenylbenzene, triphenylmethane,

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1,3,5-triphenylbenzene, 1,1,2-triphenylethylene, tetraphenylethylene, 1,2,3,4-tetrahydrocarbazole, 1,3-diphenylacetone, 2-chlorobenzophenone, 4,4'-dichlorobenzophenone; 4-benzoylphenone; 4-bromobenzophenone, 4-methoxybenzophenone, 4-methylbenzophenone, 9-fluorenone, 1-phenylnaphthalene, 3,3'-dimethoxybiphenyl, and 9-phenylanthracene.

5           24.     (new) The method of claim 23 wherein the liquid is a petroleum product.

          25.     (new) The method of claim 23 wherein the desired concentration of the first marker is between 1 ppb and 10 ppm.

          26.     (new) A method for marking a liquid comprising the steps of:

          adding a first marker to the liquid having a molar absorptivity of approximately 5 times  
10    $10^4 \text{ L mole}^{-1} \text{ cm}^{-1}$  or greater in the wavelength range of about 600 - 1000 wherein the first marker contains a compound selected from the group consisting essentially of metal containing and metal free phthalocyanine, metal containing and metal free naphthalocyanine, squarilium, croconic acid, indole and substituted indole cyanine and carbocyanine, thiazole type cyanine and carbocyanine, oxazole type cyanine and carbocyanine, metal dithiolene complexes, and  
15   indoaniline metal complexes; and

          adding a second marker to the liquid wherein the molecular weight of the second marker is artificially enhanced by the addition of a deuterium atom from the group consisting essentially of acetone, acetonitrile, benzene, bromobenzene, chlorobenzene, chloroform, cyclohexane, dichlorobenzene, trichloroethylene, diethylether, diglyme, dimethylsulfoxide, dioxane, ethanol,  
20   methanol, methylene chloride, nitrobenzene, octane, pyridine, tetrachloroethane, tetrahydrofuran,

tetrametholsilane, toluene, trifluoroacetic acid, trifluoroethyl alcohol, xylene, ammonium bromide, and acetyl chloride.

27. (new) The method of claim 26 wherein the liquid is a petroleum product.

28. (new) The method of claim 26 wherein the desired concentration of the first  
5 marker is between about 1 ppb and 10 ppm.

29. (new) A method for determining if samples of a liquid have been adulterated comprising the steps of:

adding a first marker to the samples having a molar absorptivity in the wavelength range of about 600 - 1000 nm in a first predetermined concentration;

10 adding a second marker to the samples in a second predetermined concentration wherein the second marker is a molecular marker;

testing the samples to determine the concentration of the first marker;

determining if the concentration of the first marker is within a pre-selected tolerance; and

15 if the concentration of the first marker is not within the pre-selected tolerance, testing the samples to determine the concentration of the second marker to determine if the samples have been adulterated.

30. (new) The method of claim 29 wherein the liquid is a petroleum product.

31. (new) The method of claim 29 wherein the first marker has a molar absorptivity of greater than approximately 5 times  $10^4 \text{ L mole}^{-1} \text{ cm}^{-1}$ .

32. (new) The method of claim 29 wherein the testing of the concentration of the first marker includes using an IR spectrometer.

5 33. (new) The method of claim 32 wherein the IR spectrometer is a portable IR spectrometer.

34. (new) The method of claim 29 wherein the concentration of the first marker is indicated by a peak in the IR spectrum of the tested sample.

10 35. (new) The method of claim 29 wherein the first marker contains a compound selected from the group consisting essentially of metal containing and metal free phthalocyanine, metal containing and metal free naphthalocyanine, squarilium, croconic acid, indole and substituted indole cyanine and carbocyanine, thiazole type cyanine and carbocyanine, oxazole type cyanine and carbocyanine, metal dithiolene complexes, and indoaniline metal complexes.

15 36. (new) The method of claim 29 wherein the first predetermined concentration is between 1 ppb and 10 ppb.

37. (new) The method of claim 29 wherein the second marker is non-radioactive.

38. (new) The method of claim 29 wherein the second marker is a polynuclear aromatic hydrocarbon.

39. (new) The method of claim 29 wherein the second marker is a halogenated hydrocarbon.

5 40. (new) The method of claim 29 wherein the second marker is an organic compound containing elements found in natural isotopic abundance.

41. (new) The method of claim 29 wherein the second maker is a chemical compound which is nonexistent in nature and can be identified in liquids using gas chromatograph/mass spectrometer techniques at concentrations in the range of 1 to 100 parts per  
10 billion.

42. (new) The method of claim 29 wherein the second marker has been labeled with a non-radioactive atom located at one specific site in a molecule of the molecular marker.

43. (new) The method of claim 29 wherein the second marker is selected from the group consisting essentially of 1,2-diphenylbenzene, 1,4-diphenylbenzene, triphenylmethane, 1,3,5-triphenylbenzene, 1,1,2-triphenylethylene, tetraphenylethylene, 1,2,3,4-tetrahydrocarbazole, 1,3-diphenylacetone, 2-chlorobenzophenone, 4,4'-dichlorobenzophenone, 4-benzoylphenone, 4-bromobenzophenone, 4-methoxybenzophenone, 4-methylbenzophenone, 9-fluorenone, 1-phenylnaphthalene, 3,3'-dimethoxybiphenyl, and 9-phenylanthracene.

44. (new) The method of claim 29 wherein the molecular weight of the second marker is artificially enhanced.

45. (new) The method of claim 44 wherein the molecular weight is enhanced by the addition of a deuterium atom.

46. (new) The method of claim 29 wherein the second marker is selected from the group consisting essentially of acetone, acetonitrile, benzene, bromobenzene, chlorobenzene, chloroform, cyclohexane, dichlorobenzene, trichloroethylene, diethylether, diglyme, dimethylsulfoxide, dioxane, ethanol, methanol, methylene chloride, nitrobenzene, octane, pyridine, tetrachloroethane, tetrahydrofuran, tetrametholsilane, toluene, trifluoroacetic acid, trifluoroethyl alcohol, xylene, ammonium bromide, and acetyl chloride.

47. (new) The method of claim 29 wherein the second predetermined concentration is less than 500 ppb.

48. (new) The method of claim 29 wherein the pre-selected tolerance is about 90-110% of the predetermined concentration of the first marker.

49. (new) The method of claim 29 further comprising the step of randomly choosing a subset of samples if the concentration of the first marker is within the pre-selected tolerance and testing the subset of samples to determine the concentration of the second marker to determine if the samples have been adulterated.

50. (new) The method of claim 29 wherein the concentration of the second marker is determined from a chromatographic/mass spectrometer analysis.

51. (new) A liquid marker compound comprising:  
a first marker having a molar absorptivity of approximately  $5 \times 10^4 \text{ L mole}^{-1} \text{ cm}^{-1}$  or greater in the wavelength range of about 600 to 1000 nm; and  
a second marker wherein the second marker is a molecular marker.

52. (new) A liquid marker of claim 51 wherein a desired concentration of the first marker is between 1ppb and 10ppm.

53. (new) The liquid marker of claim 51 wherein the first marker produces a characteristic peak at a known wavelength.

54. (new) The liquid marker of claim 51 wherein the first marker contains a compound selected from the group consisting essentially of metal containing and metal free phthalocyanine, metal containing and metal free naphthalocyanine, squarilium, croconic acid, indole and substituted indole cyanine and carbocyanine, thiazole type cyanine and carbocyanine, oxazole type cyanine and carbocyanine, metal dithiolene complexes, and indoaniline metal complexes.

55. (new) A liquid marker of claim 51 wherein the second marker is a polynuclear aeromatic hydrocarbon.

56. (new) The liquid marker of claim 51 wherein the second marker is a halogenated hydrocarbon.

57. (new) The liquid marker of claim 51 wherein the second marker is selected from the group consisting essentially of 1,2-diphenylbenzene, 1,4-diphenylbenzene, triphenylmethane, 1,3,5-triphenylbenzene, 1,1,2-triphenylethylene, tetraphenylethylene, 1,2,3,4-tetrahydrocarbazole, 1,3-diphenylacetone, 2-chlorobenzophenone, 4,4'-dichlorobenzophenone; 4-benzoylphenone; 4-bromobenzophenone, 4-methoxybenzophenone, 4-methylbenzophenone, 9-fluorenone, 1-phenylnaphthalene, 3,3'-dimethoxybiphenyl, and 9-phenylanthracene.

58. (new) The liquid marker of claim 51 wherein the molecular weight of the second marker is artificially enhanced.

59. (new) The liquid marker of claim 58 wherein the molecular weight is enhanced by the addition of a deuterium atom.

60. (new) The liquid marker of claim 51 wherein the second marker is selected from the group consisting essentially of acetone, acetonitrile, benzene, bromobenzene, chlorobenzene, chloroform, cyclohexane, dichlorobenzene, trichloroethylene, diethylether, diglyme, dimethylsulfoxide, dioxane, ethanol, methanol, methylene chloride, nitrobenzene, octane, pyridine, tetrachloroethane, tetrahydrofuran, tetrametholsilane, toluene, trifluoroacetic acid, trifluoroethyl alcohol, xylene, ammonium bromide, and acetyl chloride.

61. (new) The liquid marker of claim 51 wherein the presence of the first molecular marker can be determined by a handheld IR spectrometer.

62. (new) A method of testing authenticity of plurality of samples comprising the steps of:

performing a first test of the plurality for a first marker;

comparing the results of the first test to a predetermined standard;

if the results of the first test do not meet the predetermined standard, performing a second test on the plurality for a second marker to determine authenticity;

if the results of the first test meet the predetermined standard, randomly selecting a sample from the plurality and performing the second test on the sample for the second marker to determine authenticity.

63. (new) The method of claim 62 wherein the first test is an optical test.

64. (new) The method of claim 62 wherein the first test is a test for absorbance.

65. (new) The method of claim 62 wherein the second test is a chemical test.

66. (new) The method of claim 62 wherein the second test is a chromatographic test.

67. (new) The method of claim 62 comprising the further steps of:

comparing the results of the first test with the result of the second test;

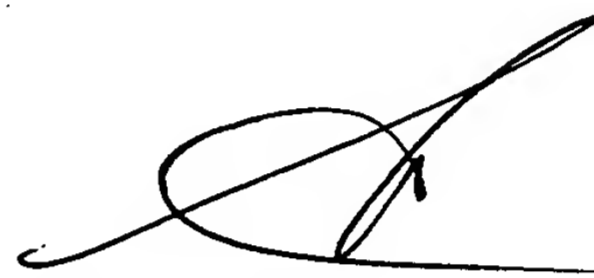
adopting the results of the second test if the results of the first test and the results of the second test do not agree.

68. the method of claim 67 comprising the further step of:  
validating a test device if the results of the first test and the results of the second test agree.

Respectfully submitted,

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